CLAIMS:

1. A method of calculating internal signals for use in a MAP algorithm, comprising the steps of:

obtaining first decoding signals by processing received systematic and received encoded symbols of each symbol sequence of a received signal;

obtaining unnormalized second decoding signals for the current symbol sequence by processing the first decoding signals of the previous sequence and second decoding signals of the previous sequence;

obtaining unnormalized third decoding signals for the current symbol sequence by processing the first decoding signals of the current sequence and third decoding signals of the next sequence;

normalizing the unnormalized second and third decoding signals; and

wherein at least one of said second decoding signals of the previous sequence and said third decoding signals of the next sequence are unnormalised.

2. A method according to claim 1, wherein said first decoding signals are of two types, one type being associated with the probability of a said systematic symbol being 0 and the other type being associated with the probability of a said systematic symbol being 1.

3. A method according to claim 2, wherein the step of obtaining current unnormalized second decoding signals is implemented by:

$$\underline{\alpha}_t(m) = \text{max-of-2}\ \{\ \underline{\alpha}_{t-1}(m^0) + \Upsilon^0_{t-1}(m^0)\ ,\ \underline{\alpha}_{t-1}(m^1) + \Upsilon^1_{t-1}(m^1)\ \} - A_{t-1}$$

where $\underline{\alpha}_t(m)$ are said current unnormalized second decoding signals for states m, $\underline{\alpha}_{t-1}(m^0)$ and $\underline{\alpha}_{t-1}(m^1)$ are respectively said prior unnormalized second decoding signals, for states m^0 and m^1, $\Upsilon^0_{t-1}(m^0)$ and $\Upsilon^1_{t-1}(m^1)$ are respectively said two types of said prior first decoding signals for states m^0 and m^1, A_{t-1} is a second decoding signal constant for a previous time period, wherein said states m^0 and m^1 are selected from said states m.

4. A method according to claim 3, wherein the step of normalizing said second decoding signal comprises the step of calculating:

$$\alpha_t(m) = \underline{\alpha}_t(m) - A_t$$

where, $\alpha_t(m)$ are said current second decoding signals for states m, $\underline{\alpha}_t(m)$ are said unnormalized second decoding signals for states m, A_t is a second decoding signal constant for the current period.

5. A method according to claim 2, wherein the step of obtaining current unnormalized second decoding signals is implemented by:

$$\underline{\alpha}_t(m) = \text{max-of-2}\ \{\ \underline{\alpha}_{t-1}(m^0) + \Upsilon^0_{t-1}(m^0)\ ,\ \underline{\alpha}_{t-1}(m^1) + \Upsilon^1_{t-1}(m^1)\ \}$$

where $\underline{\alpha}_t(m)$ are said current unnormalized second decoding signals for states m, $\underline{\alpha}_{t-1}(m^0)$ and $\underline{\alpha}_{t-1}(m^1)$ are respectively said prior unnormalized second decoding signals, for states m^0 and m^1, $\Upsilon^0_{t-1}(m^0)$ and $\Upsilon^1_{t-1}(m^1)$ are respectively said two types of said prior first decoding signals for states m^0 and m^1, wherein said states m^0 and m^1 are selected from said states m.

6. A method according to claim 5, wherein said step of normalizing said current second decoding signal comprises the step of calculating:

$\alpha_t(m) = \underline{\alpha}_t(m) - A_t - (A_1 + A_2 + \ldots + A_{t-1})$

where, $\alpha_t(m)$ is said current second decoding signals for states m, $\underline{\alpha}_t(m)$ is said unnormalized second decoding signals for states m, and A_1, A_2, ..., A_{t-1} and A_t are respectively second decoding signal constants for the first to current periods.

7. A method according to claim 4, wherein said second decoding signal constant for the current period A_t is one of:

$A_t = \text{max-of-all states} \{ \underline{\alpha}_t(m) \}$

$A_t = (\text{max-of-all states} \{ \underline{\alpha}_t(m) \} + \text{min-of-all states} \{ \underline{\alpha}_t(m) \}) / 2$

$A_t = \underline{\alpha}_t(0)$

where $\underline{\alpha}_t(m)$ is said unnormalized second decoding signals for states m.

8. A method according to claim 3, further comprising a step of setting the initial values of said unnormalized second decoding signals to selected constants.

9. A method according to claim 2, wherein the step of obtaining said unnormalized third decoding signals is implemented by:

$\underline{\beta}_t(m) = \text{max-of-2} \{ \underline{\beta}_{t+1}(m^0) + \Upsilon^0_t(m), \underline{\beta}_{t+1}(m^1) + \Upsilon^1_t(m) \} - B_{t-1}$

where $\underline{\beta}_t(m)$ are the current unnormalized third decoding signals for states m, $\underline{\beta}_{t+1}(m^0)$) and $\underline{\beta}_{t+1}(m^1)$ are respectively two values of the future unnormalized third decoding signals for states m^0 and states m^1, $\Upsilon^0_t(m)$ and $\Upsilon^1_t(m)$ are respectively said two types of said current first decoding signals for states m, B_{t-1} is a third decoding signal constant for a prior period and said states m^0 and m^1 are selected from said states m.

10. A method according to claim 9, wherein said step of normalizing said third decoding signals is implemented by calculating

$\beta_t(m) = \underline{\beta}_t(m) - B_t$

where, $\beta_t(m)$ are the current third decoding signals for states m, $\underline{\beta}_t(m)$ are the current unnormalized third decoding signals for states m, and B_t is the current third decoding signal constant.

11. A method according to claim 2, wherein the step of obtaining said unnormalized third decoding signals is implemented by:

$\underline{\beta}_t(m) = \text{max-of-2} \{ \underline{\beta}_{t+1}(m^0) + \Upsilon^0{}_t(m), \underline{\beta}_{t+1}(m^1) + \Upsilon^1{}_t(m) \}$

where $\underline{\beta}_t(m)$ are the current unnormalized third decoding signals for states m, $\underline{\beta}_{t+1}(m^0)$ and $\underline{\beta}_{t+1}(m^1)$ are respectively two values of the future unnormalized third decoding signal for states m^0 and m^1, $\Upsilon^0{}_t(m)$ and $\Upsilon^1{}_t(m)$ are respectively said two types of the current first decoding signals, wherein said states m^0 and m^1 are selected from said states m.

12. A method according to claim 11, wherein said step of normalizing said third decoding signal comprises the step of calculating

$\beta_t(m) = \underline{\beta}_t(m) - B_t - (B_1 + B_2 + \ldots + B_{t-1})$

where, $\beta_t(m)$ are the current third decoding signal for states m, $\underline{\beta}_t(m)$ are unnormalized third decoding signal for states m, and B_1, B_2, ..., B_{t-1} and B_t are respectively third decoding signal constants for the first to current periods.

13. A method according to claim 10, wherein the third decoding signal constant B_t for the current period is :

B_t = max-of-all states { $\beta_t(m)$ }

B_t = (max-of-all states { $\beta_t(m)$ } + min-of-all states { $\beta_t(m)$ }) / 2

$B_t = \beta_t(0)$

Where $\beta_t(m)$ are the current unnormalized third decoding signals for states m.

14. A method according to claim 9, wherein further comprising a step of setting the initial values of said unnormalized third decoding signals to selected constants.

15. A method according to claim 1 wherein both of said second decoding signals of the previous sequence and said third decoding signals of the next sequence are unnormalised.

16. A method according to claim 1 wherein the calculation of the internal signals is pipelined whereby the calculation for the next symbol sequence is commenced once the unnormalized signals for the current symbol sequence have been calculated.